

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TENNESSEE
AT KNOXVILLE

BOARD OF REGENTS, THE)	
UNIVERSITY OF TEXAS SYSTEM)	
and THE UNIVERSITY OF TEXAS)	
M.D. ANDERSON CANCER CENTER,)	
)	
Plaintiffs,)	
)	
v.)	No.: 3:03-CV-228
)	
CTI MOLECULAR IMAGING, INC.,)	
CTI, INC., and CTI PET SYSTEMS, INC.,)	
)	
Defendants.)	

MEMORANDUM OPINION

This patent infringement case involves certain claims in two patents owned by plaintiffs Board of Regents, the University of Texas System and the University of Texas M.D. Anderson Cancer Center (collectively “UT”). The patents at issue, U.S. Patent Nos. 5,319,204 (the ‘204 Patent) and 5,453,623 (the ‘623 Patent), concern Positron Emission Tomography (“PET”) medical imaging technology. Plaintiffs claim that defendants CTI Molecular Imaging, Inc., CTI, Inc., and CTI PET Systems, Inc. (collectively “CTI”) have infringed on plaintiffs’ patented PET technology using quadrant sharing photomultipliers and cross-coupled scintillating crystals. The defendants have counterclaimed for declaratory judgment of noninfringement and invalidity of the patents.

On June 21, 2004, the Court heard the arguments of counsel on the six pending motions: plaintiffs’ Motion for Partial Summary Judgment of Infringement [Doc. 14];

defendants' Cross-Motion for Summary Judgment of Noninfringement [Doc. 26]; plaintiffs' Motion to Strike Evidence Under Rule 37(c)(1) [Doc. 40]; defendants' Motion for Summary Judgment of Noninfringement Pursuant to 35 U.S.C. § 271(e)(1) [Doc. 48]; defendants' Motion for Summary Judgment of Invalidity [Doc. 50]; and plaintiffs' Motion for Partial Summary Judgment to Dismiss Invalidity Defenses and Counterclaims [Doc. 55]. The parties have filed excellent briefs and extensive documentation in support of and in opposition to these motions [Docs. 17, 24, 27, 29, 39, 43, 44, 46, 49, 51, 52, 53, 63, 69, 71, 74, 75, 76, 78, 81, 83, 88, 89, 91, 92], which the Court has carefully reviewed in light of the entire record and controlling authority.

For the reasons set forth herein, the plaintiffs' motion to strike [Doc. 40] will be denied; plaintiffs' motion for partial summary judgment of infringement [Doc. 14] will be denied; and defendants' cross motion for summary judgment of noninfringement [Doc. 26] will be granted. In light of the Court's rulings on these motions, the remaining motions [Docs. 48, 50, 55] will be denied as moot.

I. Relevant Facts

The patents at issue relate to Positron Emission Tomography (PET) technology. PET is a medical imaging technology that uses gamma rays to detect cancer, heart disease, brain disorders, and other health conditions. PET cameras are used to detect radiation (in the form of gamma rays) generated from a radioactive isotope injected into the human body. Affected

tissue that is subject to radioactive material emits more gamma rays than normal tissue. That difference allows PET systems to differentiate between affected and unaffected tissue.

PET cameras include a detector of at least two components: an array of scintillation crystals and a separate array of light detectors, usually comprised of photomultiplier tubes (PMTs). When a gamma ray emitted from the patient impacts a scintillation crystal, it reacts by emitting a flash of photons. This flash of photons is then channeled from the scintillation crystal to the PMTs where they are detected and converted into an electronic signal. The electronic signal is then transferred to a computer that records the location of each flash, plots the source of the radiation within the patient's body, and translates the data into a PET camera image that is displayed on a monitor. The image depicts the concentration of the injected isotope in various colors indicating the level of activity at selected locations in the body. The accuracy of the digital image is dependent on the ability of the PMTs to precisely locate the flashes of scintillation photons, or light, emitted from each scintillation crystal.

The University of Texas M.D. Anderson Cancer Center (UTMDACC) was created by the Texas legislature in 1941 as a component of The University of Texas System. UTMDACC is regarded as one of the top cancer hospitals in the nation. UTMDACC research includes the early and non-intrusive detection of cancer using PET systems.

Dr. Wai-Hoi "Gary" Wong is a professor at UTMDACC and the Director of its PET Imaging Department. Dr. Wong is named as an inventor on several patents relating to PET imaging including the '204 and the '623 patents. On May 13, 1992, Dr. Wong filed a patent application which described a quadrant sharing PET camera, as well as other inventions

relating to controlling and distributing light from crystal arrays. That application issued as the '204 patent on June 7, 1994. On June 1, 1994, Dr. Wong and an associate, Dr. Jorge Uribe, filed a related patent application for quadrant sharing PET technology, which described other light distribution inventions. That application issued as the '623 patent on September 26, 1995.

Claims 1 and 8 of the '204 patent and claims 1 and 12 of the '623 patent are the subjects of the pending infringement motions. Claims 1 and 8 of the '204 patent are as follows:

1. A positron emission tomography camera comprising:
a plurality of arrays of scintillation crystals placed in an arcuate position with adjacent arrays and adapted to surround a patient area;
and
a plurality of light detectors positioned adjacent said plurality of arrays, each light detector being adjacent one quadrant of each of four adjacent arrays.
8. A positron emission tomography camera comprising:
first and second planar members arranged on opposing sides of a patient area, each planar member including a plurality of adjacent arrays of scintillation crystals; and
a plurality of light detectors positioned adjacent said plurality of arrays in each planar member, each light detector being adjacent one quadrant of each of four adjacent arrays.

[Doc. 17, Ex. 1 at p. 8.] Claims 1 and 12 of the '623 patent are as follows:

1. A positron emission tomography camera comprising:
a plurality of arrays of scintillation crystals placed in an arcuate position with adjacent arrays and adapted to surround a patient area;
and
a plurality of circular photomultiplier tubes positioned adjacent said plurality of arrays, each light detector being adjacent one quadrant of each of four adjacent arrays.

12. A positron emission tomography camera comprising:
first and second planar members arranged on opposing sides of a patient area, each planar member including a plurality of adjacent arrays of scintillation crystals; and
a plurality of circular photomultiplier tubes positioned adjacent said plurality of arrays in each planar member, each light detector being adjacent one quadrant of each of four adjacent arrays.

[Doc. 17, Ex. 2 at p. 20.]

Quadrant sharing is an overlapping arrangement of crystal arrays and light detectors used in PET systems in which each light detector covers a quadrant of four nearby crystal arrays. Alternatively stated, each crystal array is covered by one quadrant of four different light detectors. UT contends that the quadrant sharing arrangement allows PET cameras to be built at a lower cost and to achieve a higher resolution image. Costs are lowered because a quadrant sharing system uses fewer light detectors than a traditional PET camera; higher resolution is achieved because smaller scintillation crystals can be used.

The UT patents also discuss that light from crystal arrays can be channeled or controlled by polishing individual crystals and/or by placing optical adhesives between adjacent crystals (bonding). The Summary of Invention sections of the UT patents describe polishing and bonding as “another aspect” of the inventions. Claims 4, 6-7, 11, 13-14, and 17-25 of the ‘204 patent and claims 4-11 and 15-32 of the ‘623 patent involve light control and distribution of crystal arrays.

CTI entered the positron emission tomography business in 1983, and are leading designers, developers, and manufacturers of PET imaging equipment and related equipment. CTI has developed and manufactured PET cameras since at least 1983.

CTI has developed three PET camera designs using a quadrant sharing arrangement that are accused to infringe UT's patents: (i) the HRRT (high resolution research tomograph); (ii) the PET/SPECT; and (iii) the P39. The HRRT design consists of a hybrid crystal array that combines LSO crystals with GSO or LYSO crystals. The crystal block of CTI's design is formed by gluing a block of LSO crystal on top of a block of GSO (or LYSO) crystal of equal size. The composite is then cut in a cross-hatched pattern to form an array of separate optically isolated single crystals. The combined crystal array is mounted on a glass light guide positioned between the crystal array and four associated PMTs. The light guide is made of optical glass and is designed to direct light emitted by the scintillation crystals to the associated PMTs. CTI's detector design also includes an ultra-violet transmittent plastic light coupling window that is positioned between, and permanently bonded to, the surface of the light guide on one side and the associated PMTs on the other side.

CTI's PET/SPECT design consists of a matrix of sodium iodide crystals attached to a layer of LSO crystals mounted on a glass light guide. The crystal array/light guide assemblies are mounted on an optical glass window and the PMTs are mounted on the other side of the glass window.

The P39 detector is similar in design to the HRRT. The P39 includes an array of PMTs separated from an array of scintillation crystals by an external light guide and a light-coupling window. Unlike the HRRT, however, the P39 uses only LSO crystals. Rather than forming the crystal array by cutting slits in a solid crystal block, the P39 crystal arrays are formed by inserting individual crystals into a pre-formed mold so that each crystal within the

array remains optically isolated. CTI's invention does not use selective bonding and polishing of the crystals to control the spread of scintillation photons within the crystal array (*i.e.*, there is no internal light distribution within the array). Instead, the spread of scintillation photons is controlled through the use of the external non-scintillating light guide.

II. Plaintiffs' Motion to Strike Evidence Under Rule 37(c)(1) [Doc. 40]

Plaintiffs have moved, pursuant to Fed. R. Civ. P. 37(c)(1), to strike two of CTI's noninfringement defenses which were raised in CTI's Cross Motion for Summary Judgment of Noninfringement [Doc. 26]. Plaintiffs contend the defenses were not disclosed prior to CTI's cross motion despite discovery requests and requests for supplementation of CTI's discovery responses. As asserted in plaintiffs' motion, the new noninfringement defenses are:

- (1) CTI alleges that it does not infringe UT's patents because the phrase "array of scintillation crystals" requires (a) internal light distribution through a crystal matrix that is precise and symmetrical, (b) light distribution that is localized within each crystal array, and (c) arrays that are not formed by making spaced cuts in a crystal block, and (d) arrays that do not require an external light guide to channel light. [CTI's Cross Motion, pp. 42-43.]
- (2) CTI alleges that it does not infringe because it uses a "light coupling window" placed between a light guide and light detectors. [CTI's Cross Motion, pp. 41-42.]

[Doc. 40 at p. 2.] UT claims that these defenses were not disclosed in discovery responses or during CTI's 30(b)(6) deposition. Instead, UT complains that these defenses were only revealed after UT filed its motion for partial summary judgment of infringement. UT

contends that CTI's failure to disclose these defenses was prejudicial to UT. Thus, UT argues that CTI should be precluded from using these defenses. [Doc. 40.]

CTI argues that the two noninfringement defenses are not new but merely refined defenses based on information acquired after UT filed its summary judgment motion. CTI also argues that, at the time of its cross motion, discovery was still open and ongoing. CTI further contends that UT has failed to point to any prejudice or other harm from CTI's allegedly new defenses. Notably, UT responded fully to CTI's cross motion for noninfringement without requiring additional discovery. Finally, CTI argues that precluding CTI from relying on these noninfringement defenses is too harsh a remedy for these facts. [Doc. 44.]

In reply, UT argues that CTI failed to seasonably supplement its interrogatory responses in which it was asked to reveal the factual bases for its noninfringement defense. UT contends that CTI's failure to supplement was not justified or harmless. UT also argues that many of the cases relied upon by CTI are inapposite as they were decided prior to the 2000 amendment to Rule 37(c)(1). [Doc. 46.]

Rule 37(c)(1) provides in part as follows:

A party that without substantial justification fails to disclose information required by Rule 26(a) or 26(e)(1), or to amend a prior response to discovery as required by Rule 26(e)(2), is not, unless such failure is harmless, permitted to use as evidence at a trial, at a hearing, or on a motion any witness or information not so disclosed. In addition to or in lieu of this sanction, the court, on motion and after affording an opportunity to be heard, may impose other appropriate sanctions.

Fed. R. Civ. P. 37(c)(1). As noted by UT, Rule 37(c) was amended in 2000 to specifically reference the failure to supplement discovery as required by Rule 26(e)(2).¹ The advisory committee notes to this amendment state that “this sanction power only applies when the failure to supplement was ‘without substantial justification.’ Even if the failure was not substantially justified, a party should be allowed to use the material that was not disclosed if the lack of earlier notice was harmless.” Fed. R. Civ. P. 37(c)(1) 2000 advisory committee note. The Sixth Circuit has indicated that trial courts should not exclude evidence under Rule 37 unless the failure to disclose is both unjustified and harmful. *United States v. Rapanos*, 376 F.3d 629, 644-45 (6th Cir. 2004). The burden of proving harmlessness is on the potentially sanctioned party. *Id.*; *Roberts ex rel. Johnson v. Galen of Virginia, Inc.*, 325 F.3d 776, 782 (6th Cir. 2003).

A review of the relevant history of the case is appropriate in considering UT’s motion. This case was originally filed in the United States District Court for the Southern District of Texas at Houston on May 1, 2002. CTI filed its answer and counterclaim to the original complaint asserting the defense of noninfringement without factual elaboration on October 15, 2002. UT noticed CTI for a Rule 30(b)(6) deposition on November 6, 2002 and the 30(b)(6) deposition of Dr. Ronald Nutt, President of CTI PET Systems, was taken on December 19, 2002. Dr. Nutt testified that CTI does not infringe the UT patents because

¹Fed. R. Civ. P. 26(e)(2) provides that “[a] party is under a duty seasonably to amend a prior response to an interrogatory, request for production, or request for admission if the party learns that the response is in some material respect incomplete or incorrect and if the additional or corrective information has not otherwise been made known to the other parties during the discovery process or in writing.”

“CTI scintillation crystals are not adjacent to the PMTs, and we use a totally different technique for light sharing.” [Doc. 44, Ex. A at p. 39.] CTI’s initial disclosures pursuant to Rule 26(a)(1) were served on November 18, 2002, and identified potential witnesses who have knowledge of CTI’s allegedly infringing devices. Plaintiff filed its First Amended Complaint on December 2, 2002, to which CTI responded and counterclaimed on December 20, 2002, again asserting the defense of noninfringement without factual elaboration. UT served requests for documents on December 20, 2002, including a request for “[a]ll documents concerning CTI’s contention that it has not and is not infringing the asserted patents.” [Doc. 40, Ex. 7 at ¶ 47] UT also propounded interrogatories on March 11, 2003, wherein interrogatory number 4 asks, “[p]lease identify all bases, facts, documents, and expected witness testimony concerning CTI’s third and fourth affirmative defenses of non-infringement.” [Doc. 40, Ex. 5.] The case was transferred to this Court on April 11, 2003. CTI responded to UT’s interrogatories on April 23, 2003. CTI’s response to interrogatory number 4 states in pertinent part:

...CTI states that its products do not infringe either of the asserted patents because, *inter alia*, the photomultiplier tubes in CTI’s products are separated from the array of scintillation crystals by a light guide and are therefore not “adjacent” each other as required by each independent claim of both patents. CTI further states that it does not infringe Plaintiffs’ patents because Plaintiffs’ patents are invalid and it is impossible to infringe an invalid patent. CTI further states that it does not infringe Plaintiffs’ patents because Plaintiffs specifically limited the scope of their purported invention during prosecution of their patent applications to exclude PET imaging devices utilizing light guides to channel photon emissions. CTI further states that its PET devices are patentably distinct from Plaintiffs’ patents as evidenced by the fact that the United States Patent Office granted CTI a patent on its unique devices. CTI further states that it reserves the right to amend and supplement this response

to the extent required by Fed. R. Civ. P. 26(e) as more information becomes available through discovery.

[Doc. 40, Ex. 6 at pp. 10-11.]

On May 14, 2003 and again on December 11, 2003, UT requested that CTI supplement its discovery responses, although it is notable that neither request specifically asked for additional information on interrogatory number 4. Following a scheduling conference with counsel for the parties, this Court entered a Scheduling Order [Doc. 12] on September 30, 2002, which established a deadline for completing all discovery by May 19, 2004 (90 days before trial), a deadline for filing dispositive motions by April 19, 2004 (120 days before trial), and a trial date of August 17, 2004. UT filed its motion for summary judgment of infringement on November 24, 2003, nearly five (5) months before the deadline for filing dispositive motions and six (6) months before the discovery cut-off. CTI's response to UT's motion and its cross motion for summary judgment, where the allegedly new defenses appeared, was filed January 27, 2004. On February 4, 2004, CTI then supplied UT with supplemental interrogatory responses, including this response to interrogatory number 4:

...CTI states that its products do not infringe either of the asserted patents because, *inter alia*, there are at least two claim elements, both of which are critical to the operation of Plaintiffs' invention as claimed in the patents-in-suit, that are not present in CTI's devices.

First, each of the patent claims asserted in this action require a PET camera having an array of scintillation crystals positioned "adjacent" an array of light detectors. The crystal arrays in CTI's PET cameras are not "adjacent" the light detectors because a functional light guide is positioned adjacent the

crystal arrays and a light-coupling window is placed in between the light guide and the light detectors.

Second, each of the claims asserted against CTI require an “array of scintillation crystals” that internally controls light distribution to the light detectors within the crystal matrix. The asserted claims also require that each array of crystals be optically isolated from adjacent arrays. In CTI’s PET cameras, the scintillation crystal arrays are incapable of controlling light distribution to the light detectors within the crystal matrix because each crystal within the crystal array is optically isolated. CTI’s PET cameras therefore rely on an external light guide and a light-coupling window to ensure light distribution to the light detectors. Moreover, CTI’s PET cameras allow light distribution across the boundaries of adjacent arrays by virtue of the light-coupling window that extends across multiple crystal arrays.

CTI further states that it does not infringe Plaintiffs’ patents because Plaintiffs’ patents are invalid and it is impossible to infringe an invalid patent. CTI further states that it does not infringe Plaintiffs’ patents because Plaintiffs specifically limited the scope of their purported invention during prosecution of their patent applications to exclude PET imaging devices utilizing light guides to channel photon emissions. CTI further states that its PET devices are patentably distinct from Plaintiffs’ patents as evidenced by the fact that the United States Patent Office granted CTI a patent on its unique devices. CTI further states that it reserves the right to amend and supplement this response to the extent required by Fed. R. Civ. P. 26(e) as more information becomes available through discovery.

[Doc. 46, Ex. 10.] UT’s 58-page brief supporting its motion and in opposition to CTI’s cross motion [Doc. 39] was filed March 11, 2004, along with the instant motion to strike.

After carefully reviewing the pending motions, the Court does not find that CTI has failed to supplement its discovery responses to such an extent that the two noninfringement defenses should be excluded. It is worth noting that UT’s motion for partial summary judgment of infringement was filed nearly six (6) months prior to the close of discovery, a period in which the parties are expected to develop their theories. It is also worth noting that

UT's requests for supplementation admittedly did not reference interrogatory number 4, which relates to the noninfringement defenses. And, as CTI points out, UT did not move for additional time to take discovery pursuant to Fed. R. Civ. P. 56(f) prior to responding to CTI's cross motion. CTI's initial discovery responses and Dr. Nutt's deposition alerted UT to issues of an "array of scintillation crystals" and the existence of light guides in CTI's devices, although those defenses were not articulated as clearly as they are in CTI's cross motion and supplemental discovery responses. UT is correct that the existence of a "light coupling window" was not disclosed prior to CTI's cross motion² and the record is silent on the reason for the absence of such information, although one could assume that it is subsumed by Dr. Nutt's testimony that CTI uses "a totally different technique for light sharing." [Doc. 44, Ex. A at p. 39.] UT's proposed sanction of excluding these defenses is a harsh, and in this case, unjustified penalty and would not further the interests of justice. Accordingly, UT's motion to strike will be denied.

²CTI contends that the existence of the light coupling window is revealed in certain documents produced to UT and that if UT had only reviewed the documents, plaintiffs would have observed two structures in between the PMTs and the crystal arrays in CTI's accused devices. [Doc. 44 at p. 6, Ex. B.] The Court has reviewed CTI's documents and if a light coupling window is disclosed in such documents, it is not apparent to the undersigned. The documents reveal a light guide and, in some documents, a "glass slide" along with the crystal array and the light guide. The parties' submissions do not indicate whether the "glass slide" is the same structure as a "light coupling window."

III. UT's Partial Motion for Summary Judgment of Infringement and CTI's Cross Motion for Summary Judgment of Noninfringement

UT has moved for partial summary judgment on the issue of infringement, that is, whether the photomultiplier tubes, or light detectors, are “adjacent” to the scintillation crystal arrays in CTI’s accused quadrant sharing PET cameras. [Doc. 14 at p. 2.] In response, CTI filed a cross motion for summary judgment [Doc. 26] requesting dismissal of plaintiffs’ claims of patent infringement and a declaration that the ‘204 and ‘623 patents are not infringed by any product or device made, used or sold by defendants. CTI contends that the light guide and light coupling window in its devices preclude a finding that its light detectors are “adjacent” to its crystal arrays, and further that the patent claims at issue require an “array of scintillation crystals” that internally control light distribution to the light detectors without the necessity of an external light guide. [Doc. 29 at p. 2.] Thus, where the parties do not dispute the structure of the accused device, the allegation of literal infringement focuses on the issue of claim construction, a question of law for the Court properly addressed at summary judgment. *Athletic Alternatives, Inc. v. Prince Mfg., Inc.*, 73 F.3d 1573, 1578 (Fed. Cir. 1996) (“Where, as here, the parties do not dispute any relevant facts regarding the accused product but disagree over which of two possible meanings ... is the proper one, the question of literal infringement collapses to one of claim construction and is thus amenable to summary judgment.”).

A. Standard for Summary Judgment

Under Fed. R. Civ. P. 56(c), summary judgment is proper if “the pleadings, depositions, answers to interrogatories, admissions on file, together with the affidavits, if any, show that there is no genuine issue of material fact and that the moving party is entitled to judgment as a matter of law.” The burden of establishing there is no genuine issue of material fact lies upon the moving party. *Celotex Corp. v. Catrett*, 477 U.S. 317, 330 n.2 (1986). The court must view the facts and all inferences to be drawn therefrom in the light most favorable to the non-moving party. *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 587 (1986). To establish a genuine issue as to the existence of a particular element, the non-moving party must point to evidence in the record upon which a reasonable jury could find in its favor. *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986). The genuine issue must also be material; that is, it must involve facts that might affect the outcome of the suit under the governing law. *Id.*

The judge's function at the point of summary judgment is limited to determining whether sufficient evidence has been presented to make the issue of fact a proper jury question, and not to weigh the evidence, judge the credibility of witnesses, and determine the truth of the matter. *Id.* at 249. Thus, “[t]he inquiry performed is the threshold inquiry of determining whether there is the need for trial - whether, in other words, there are any genuine factual issues that properly can be resolved only by a finder of fact because they may reasonably be resolved in favor of either party.” *Id.* at 250.

B. Infringement Analysis

As the parties have stated, patent infringement analysis involves two steps: the threshold construction of the meaning and scope of the asserted claim(s), followed by the determination of whether the accused product infringes the properly construed claim. *Athletic Alternatives, Inc.*, 73 F.3d at 1578; *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1365 (Fed. Cir. 2002). The burden is on the patent owner to establish infringement by a preponderance of the evidence. *Tanabe Seiyaku Co., Ltd. v. U.S. Int’l Trade Comm’n*, 109 F.3d 726, 731 (Fed. Cir. 1997). While the first step involves a question of law, the second question is a factual question. *Hormone Research Foundation, Inc. v. Genentech, Inc.*, 904 F.2d 1558, 1562 (Fed. Cir. 1990). To infringe, an accused device must embody each claim limitation or its equivalent. *Sofamor Danek Group, Inc. v. DePuy-Motech, Inc.*, 74 F.3d 1216, 1220 (Fed. Cir. 1996); *Baxter Healthcare Corp. v. Spectramed, Inc.*, 49 F.3d 1575, 1582 (Fed. Cir. 1995) (literal infringement “requires that each limitation in the asserted claim be found present in the accused device or process”). Since the parties do not dispute the structure of CTI’s accused devices, the infringement analysis turns on the interpretation of the claims. *CCS Fitness, Inc.*, 288 F.3d at 1365.

C. Claim Construction

As evidenced by the parties’ briefs, there is no shortage of case law on the subject of claim construction. And, upon careful examination, the parties do not seriously disagree about the proper method of claim construction; rather, they disagree about what the result of the Court’s claim construction analysis should be. The Court observes at the outset that the

answer to such inquiry is not patently obvious in this case, inasmuch as both parties have provided persuasive and well-supported arguments.

Claim construction, or claim interpretation as it is sometimes described, begins with an examination of the claims themselves. *Texas Digital Sys., Inc. v. Telegenix, Inc.*, 308 F.3d 1193, 1201-1202 (Fed. Cir. 2002) (“In construing claims, the analytical focus must begin and remain centered on the language of the claims themselves, for it is that language that the patentee chose to use to ‘particularly point[] out and distinctly claim[] the subject matter which the patentee regards as his invention.’”). Courts must review the claim language with a “heavy presumption” that a claim term is interpreted as to its ordinary and customary meaning. *CCS Fitness, Inc.*, 288 F.3d at 1366; *see Texas Digital Sys., Inc.*, 308 F.3d at 1202 (“The terms used in the claims bear a ‘heavy presumption’ that they mean what they say and have the ordinary meaning that would be attributed to those words by persons skilled in the relevant art.”). The ordinary meaning of a claim term may be ascertained by consulting dictionary definitions. *CCS Fitness, Inc.*, 288 F.3d at 1366; *Inverness Medical Switzerland GmbH v. Princeton Biomeditech Corp.*, 309 F.3d 1365, 1369 (Fed. Cir. 2002) (“It is well settled that dictionaries provide evidence of a claim term’s ‘ordinary meaning.’”). Moreover, unless compelled to do otherwise, a court will give a claim term the full range of its ordinary meaning as understood by persons skilled in the relevant art. *Texas Digital Sys., Inc.*, 308 F.3d at 1202.

The Federal Circuit has cautioned against consulting the written description and prosecution history before attempting to discern the ordinary and customary meanings of

claim terms as inviting “a violation of our precedent counseling against importing limitations into the claims.” *Intellectual Prop. Dev., Inc. v. UA-Columbia Cablevision of Westchester, Inc.*, 336 F.3d 1308, 1315 (Fed. Cir. 2003) (quoting *Texas Digital Sys., Inc.*, 308 F.3d at 1204). Indeed, this Court is instructed that dictionaries are reliable sources of information on the established meanings that would be attributed to claim terms by those skilled in the art. *Intellectual Prop. Dev., Inc.*, 336 F.3d at 1315; *Texas Digital Sys., Inc.*, 308 F.3d at 1202. The Court is further instructed that because words often have multiple dictionary definitions, the intrinsic record must always be consulted to identify which of the different possible dictionary meanings of the claim terms in issue is most consistent with the use of the words by the inventor. *Intellectual Prop. Dev.*, 336 F.3d at 1315; *Texas Digital Sys., Inc.*, 308 F.3d at 1203.

An accused infringer may overcome the “heavy presumption” that a claim term’s ordinary meaning is consistent with its dictionary definitions in one of four ways. *CCS Fitness, Inc.*, 288 F.3d at 1366-67. First, the claim term will not receive its ordinary meaning if the patentee acted as his own lexicographer and clearly set forth a definition of the disputed claim term in either the specification or prosecution history. *Id.* at 1366. Second, the pertinent issue in this case, a claim term will not carry its ordinary meaning if the intrinsic evidence shows that the patentee distinguished that term from prior art on the basis of a particular embodiment, expressly disclaimed subject matter, or described a particular embodiment as important to the invention. *Id.* at 1366-67; *Intellectual Prop. Dev., Inc.*, 336 F.3d at 1316 (presumption will be rebutted “if the inventor has disavowed or disclaimed

scope of coverage, by using words or expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope”). Third, a claim term will not have its ordinary meaning if the term chosen by the patentee so deprives the claim of clarity as to require resort to the other intrinsic evidence for a definite meaning. *CCS Fitness, Inc.*, 288 F.3d at 1367. Finally, a claim term will cover nothing more than the corresponding structure or step disclosed in the specification, as well as equivalents thereto, if the patentee phrased the claim in step- or means-plus-function format. *Id.*

After review of the claim language, courts should consider the patent specification and prosecution history. *DeMarini Sports, Inc. v. Worth, Inc.*, 239 F.3d 1314, 1324 (Fed. Cir. 2001). If the intrinsic evidence (*i.e.*, the claims, the specification and the prosecution history) is ambiguous, the Court may look to extrinsic evidence to resolve the scope and meaning of a claim term. *CCS Fitness, Inc.*, 288 F.3d at 1366; *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1309 (Fed. Cir. 1999) (“it is entirely appropriate, perhaps even preferable, for a court to consult trustworthy extrinsic evidence to ensure that the claim construction it is tending to from the patent file is not inconsistent with clearly expressed, plainly apposite, and widely held understandings in the pertinent technical field”). The Court may not, however, use extrinsic evidence to vary the plain meaning of a claim term found in the intrinsic record. *Interactive Gift Express, Inc. v. Compuserve, Inc.*, 256 F.3d 1323, 1332 (Fed. Cir. 2001); *Southwall Tech, Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1578 (Fed. Cir. 1995).

Armed with these principles, the Court first addresses the meaning of “adjacent” as used in the asserted claims.

D. “Adjacent”

UT argues that “adjacent” means “near” or “close” as well as “adjoining” or “next to.” [Doc. 14 at pp. 16-17.] Thus, UT contends that “adjacent,” as used in the ‘204 and ‘623 patents includes both “adjacent” objects that do or do not have an intervening structure in between them. CTI contends that “adjacent” should be properly construed as meaning “adjoining” or “next to” and precludes the presence of a light guide positioned between the crystal arrays and the light detectors. [Doc. 29 at p. 20.] The parties cite to the following definitions of “adjacent” in support of their respective positions:

“Lying near or close (to); adjoining; contiguous, bordering. (Not necessarily *touching*, though this is by no means precluded.)” *Oxford English Dictionary Online* (Oxford University Press 2003). [Doc. 17, Ex. 25.]

“Not distant or far off ... nearby but not touching; relatively near and having nothing of the same kind intervening; having a common border; immediately preceding or following with nothing of the same kind intervening.” *Webster’s Third New International Dictionary* (Merriam-Webster, Inc. 1986). [Doc. 17, Ex. 26 at 3.]

“Close to; lying near; next to; adjoining.” *The American Heritage College Dictionary* (3rd ed.1997). [Doc. 17, Ex. 27 at 3; Doc. 27, Ex. F.]

“Not distant: nearby; having a common endpoint or border; immediately preceding or following. ...Adjacent may or may not imply contact but always implies absence of anything of the same kind in between.” *Webster’s Ninth New Collegiate Dictionary* (Merriam-Webster, Inc. 1990). [Doc. 17, Ex. 28 at 3; Doc. 27, Ex. G.]

Thus, it is clear from the record that dictionaries define “adjacent” both ways; *i.e.*, as UT suggests and as CTI suggests. Therefore, the Court must consider the meaning of “adjacent” in light of the patent specification and prosecution history.

Neither the ‘204 nor the ‘623 patent contain a definition for the term “adjacent.” The body of the ‘204 patent uses the term “adjacent” several times to describe the spatial relationship between a crystal array and a photomultiplier tube or between individual crystals within an array. In two instances, the patent describes the offset arrangement of crystal arrays and PMTs as “directly adjacent” or “immediately adjacent.” [Doc. 17, Ex. 1 at p. 6, column 3, line 13, and p. 7, column 5, line 24.] The patentee’s use of the descriptive “directly” or “immediately” with the claim term “adjacent” suggests, but does not compel, the inference that there is a distinction between “adjacent” and “directly adjacent” or “immediately adjacent.” The ‘623 patent repeatedly uses the term “adjacent” to describe the relationship between crystal arrays and PMTs or between individual crystals within an array. [Doc. 17, Ex. 2.] Thus, the patent specifications do not provide conclusive direction as to the proper construction of “adjacent” and the Court will therefore examine the prosecution history.

As the record indicates, the ‘204 patent application was initially rejected by the Patent and Trademark Office [Doc. 17, Ex. 10]. The examiner rejected claims 1 and 8, among others which are not at issue here, as being anticipated by Dr. Wong’s earlier work. Specifically, the examiner stated,

Wong et al in fig. 14 show light detectors being adjacent in each of four adjacent quadrants. The techniques of bonding and polishing crystals are inherent in emission topography [sic] cameras as well as the planar or arcuate geometry for surrounding patients.

[Doc. 17, Ex. 10 at p. 2.] Claims 2, 9, and 10, which are not asserted in this case, were rejected on the basis of the Chang prior art. [*Id.* at p. 3.] In response to the office action, the patentee requested reconsideration and responded to the objection concerning claims 1 and 8 as follows:

The Examiner asserts that the *Wong et al.* (1984) reference shows light detectors adjacent in each of four adjacent quadrants. However, the Examiner overlooks that *Wong et al.*, teaches only a single array comprised of 16 crystals, wherein four light detectors (photomultiplier (PMT) tubes) are positioned over four quadrants of the single array.

The present invention, in contrast, contemplates a plurality of crystal arrays wherein light detectors are positioned over the arrays in an offset arrangement. Each light detector is large enough to cover an entire array, but, due to the symmetrical offset arrangement, is positioned over only one quadrant of each of four adjacent arrays.

* * *

Moreover, in any event, *Wong et al.* contains no disclosure of selective adhesive bonding. Rather, *Wong et al.* discloses coupling the scintillation crystals to a crystal pedestal, wherein the pedestal serves as a light guide to roughly channel a majority of the light generated to the primary PMT, and less light to the other photomultiplier tubes. But, such channeling is not precise, as the light guide also acts inherently as a light mixing medium, which bounces part of the light throughout the entire light guide. This mixing of light within the light guide will confuse the location of the light source, inherently rendering decoding of the origin of the light imprecise and decreasing the effective resolution of the system.

[Doc. 17, Ex. 11 at p. 9, 12 (emphasis in original).]

Dr. Wong also submitted an affidavit in support of the request for reconsideration of the '204 patent [Doc. 17, Ex. 12]. Referring to the Chang prior art which disclosed a Single Photon Emission Computed Tomography (SPECT) camera, Dr. Wong testified in pertinent part as follows:

19. As a result of its construction, a SPECT detector design such as that disclosed in the Chang reference requires light guides between the crystal array and the PMT for the distribution of light.

20. The Chang reference uses imprecise light guides 66 and 67 to “aim” each PMT roughly toward the “center” of their respective active fields of view and uses the same light guide for all crystals in the array. Col. 12, lines 7-17.

21. The light guide of Chang’s design allows undesirable light mixing, resulting in insufficient symmetrical control dependent on crystal location within the array. Therefore, Chang’s distribution means cannot distribute light optimally for positioning, and there is also lower optical efficiency (*i.e.*, a wider peak-width), resulting in inaccurate position decoding. Accordingly, decoding the location of light emission from within the array of Chang’s design is inherently imprecise.

22. Because Chang’s design uses light guides, he cannot offset his PMT’s symmetrically in two dimensions, as in my invention, and he cannot decode as many crystals as my invention and still have enough decoding accuracy to differentiate cleanly all of the scintillation crystals.

[Doc. 17, Ex. 12 at ¶¶ 19-22.]

CTI asserts that the statements made in the amendment to the '204 patent and the statements in Dr. Wong’s affidavit constitute a disclaimer of any interpretation of the use of a light guide between the crystal arrays and light detectors. [Doc. 29 at pp. 25-28.] CTI further argues that this disclaimer applies to all independent claims in the patent and

specifically that Dr. Wong's statements cannot be construed only as to claims other than those asserted in this case. [*Id.* at p. 28.]

UT argues that nothing in the prosecution history indicates that claims 1 and 8 do not or cannot cover devices with light guides and that the quotations above are not words or expressions of manifest exclusion or restriction. [Doc. 39 at p. 29]; *see Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1327 (Fed. Cir. 2002) (ordinary meaning of claim term applies “unless the patentee demonstrated an intent to deviate from the ordinary and accustomed meaning of a claim term by redefining the term or by characterizing the invention in the intrinsic record using words or expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope”); *Bayer AG v. Elan Pharm. Research Corp.*, 212 F.3d 1241, 1251 (Fed. Cir. 2000) (there must be a “clear and unmistakable surrender of subject matter”). UT further argues that the statements regarding the Chang reference are not directed to claims 1 and 8 but to unasserted claims. Thus, UT contends that statements in the prosecution history that apply only to other claims that explicitly recite features absent from the asserted claims cannot be held to limit claim scope. [*Id.* at p. 40.] CTI urges the Court to conclude that Dr. Wong's statements could not be a more direct expression of manifest exclusion or restriction that symmetrical offsetting is not possible when light guides are used to control light distribution. [Doc. 43 at p. 11.]

This Court is instructed to consider prior art patents cited in the prosecution history as part of the intrinsic evidence. *Kumar v. Ovonic Battery Co.*, 351 F.3d 1364, 1368 (Fed. Cir. 2003). One of the prior art patents cited by UT in the '204 patent is U.S. Patent No.

4,733,083 (the “‘083 patent”), also invented by Dr. Wong which relates to “Light Guides for a Positron Emission Tomography Camera.” [Doc. 17, Ex. 29.] Notably, the ‘083 patent provides for:

A row of light detectors such as photomultiplier tubes are positioned *adjacent* each row of each crystal for receiving detected radiation from the adjacent rows of crystals and the number of light detectors in each row is greater than the number of planes of crystals. A row of light guides are positioned between each row of crystals and each row of coating light detectors.

[*Id.* at p. 5, col.1, lines 65-68, col. 2, lines 1-3 (emphasis added).] The ‘204 patent also relies on U.S. Patent No. 4,883,966 (the “‘966 patent”), invented by Dr. Wong which relates to a “PET Camera With Crystal Masking.” [Doc. 17, Ex. 30.] The ‘966 patent claims in part a PET camera with:

a row of light detectors positioned *adjacent* each row of crystals for receiving detected radiation from the adjacent row of crystals,
a row of reflecting masks positioned between each row of crystals and each row of coating light detectors.

[*Id.* at p. 6, col. 4, lines 48-53 (emphasis added).]

Thus, the prosecution history, as a whole, contains evidence to support both arguments. The Court cannot therefore conclude that the definition of “adjacent” is unambiguous and may consider extrinsic evidence, including prior art not cited in the prosecution history. *Bell & Howell Document Mgmt. Prods. Co. v. Altek Sys.*, 132 F.3d 701, 706 (Fed. Cir. 1997). Extrinsic evidence cannot, however, be used to vary or contradict the plain meaning of the claims. *Interactive Gift Express, Inc.*, 256 F.3d at 1332. CTI

vigorously argues that the Court is inviting reversible error by considering any extrinsic evidence on the meaning of “adjacent.” [Doc. 29 at pp. 29-31.]

UT relies on CTI’s patents for the accused devices, U.S. Patent Nos. 6,288,399 (the ‘399 Patent) and 6,362,479 (the ‘479 Patent) which describe quadrant sharing PET systems. In both the ‘399 and the ‘479 Patent, CTI uses the term “adjacent” to describe the physical relationship between crystal arrays and light detectors which are separated by a light guide. [Doc. 17, Ex. 23 at p. 11, Ex. 24 at p. 46.] UT also points to U.S. Patent No. 6,552,348 (the ‘348 Patent) issued April 22, 2003, which describes scintillation crystals as being “adjacent” light detectors despite the intervening presence of a light guide. [Doc. 17, Ex. 31 at p. 25.] Finally, UT points to several journal articles authored by CTI personnel which credit the quadrant sharing invention to Dr. Wong, a point that CTI does not really contest. [Doc. 17, Exs. 16-21.]

The Court has carefully considered all the evidence and the arguments presented on the issue of the meaning of “adjacent” in the patents at issue. It is worth noting that this is indeed a close question, with meritorious arguments on both sides. However, careful review of the ‘204 and the ‘623 patents and the prosecution history of those patents leads the Court to conclude that defendants’ interpretation of “adjacent” is correct.

As UT notes, dictionary definitions for “adjacent” include the both the presence or the absence of intervening materials between items that are “near,” “close,” “next to,” or “adjoining.” The patents’ use of the term “directly adjacent,” however, appears to preclude the presence of intervening materials. The patentee has used the term “directly adjacent”

when describing the location of the crystal arrays with respect to the PMTs and appears to use the term “directly adjacent” interchangeably with the term “adjacent.” Thus, while the Court must conclude that the term “adjacent” as used in the ‘204 and the ‘623 patents includes all of the potential definitions, the use of the term “directly adjacent” suggests, albeit slightly, a preference for the definition proposed by defendants.

In reviewing the prosecution history of the patents at issue, Dr. Wong’s statements in support of the ‘204 patent tips the balance in favor of defendants on this question. Dr. Wong unequivocally stated that an external light guide “will confuse the location of the source” and “decreas[e] the effective resolution of the system.” [Doc. 27, Ex. K at p. 12.] Additionally, in distinguishing the Chang reference, Dr. Wong emphasized that the “light guide of Chang’s design allows undesirable light mixing, resulting in insufficient symmetrical control dependent on crystal location within the array. ...Because Chang’s design uses light guides, he cannot offset his PMT’s symmetrically in two dimensions, as in my invention” [Doc. 27, Ex. J at ¶¶ 21-22.] Careful review of these statements leads the Court to conclude that Dr. Wong did not believe that his quadrant-sharing technique would be feasible in conjunction with a light guide. While UT argues vigorously that Dr. Wong’s statements were directed toward claims other than those asserted in this case, the Court is of the opinion that statements by a patentee that criticize or disclaim certain structures in order to distinguish the invention apply to all claims in the patent covering that invention. *Acco Brands, Inc. v. Micro Sec. Devices, Inc.*, 346 F.3d 1075, 1078-79 (Fed. Cir. 2003).

Therefore, the Court concludes that the term “adjacent” as used in the ‘204 and ‘623 patents means “next to” or “adjoining” and precludes the presence of an intervening structure. Because the Court’s ruling on this issue is outcome determinative, CTI’s arguments regarding the interpretation of “array of scintillation crystals” need not be addressed.

E. Literal Infringement

As both parties have noted, once the Court resolves the claim construction step, the next step in infringement analysis is to compare the claim language with the allegedly infringing devices to determine whether elements of the claim are literally found in those devices. *Teleflex*, 299 F.3d at 1323. Literal infringement requires that every element of a claim be present in the accused device. *Baxter Healthcare Corp.*, 49 F.3d at 1582; *Unique Concepts, Inc. v. Brown*, 939 F.2d 1558, 1562 (Fed. Cir. 1991). A product having extra elements or components may still infringe a claim so long as it has all the elements listed in the claim. *Carl Zeiss Stiftung v. Renishaw PLC*, 945 F.2d 1173, 1178 (Fed. Cir. 1991). While the question of whether a product infringes a claim is a question of fact, the parties agree that literal infringement collapses into claim construction as a matter of law when the nature and construction of the accused device is not in dispute. *Athletic Alternatives, Inc.*, 73 F.3d at 1578. The parties do not dispute the nature or construction of CTI’s accused devices, thus rendering this issue appropriate for resolution at summary judgment.

UT argues that CTI’s accused devices, the HRRT, the PET/SPECT, and the P-39, literally infringe the ‘204 and the ‘623 patents. UT notes that CTI admittedly uses the

quadrant sharing concept in the accused devices and that its structural defense relies on the intervening light guide. CTI contends that their devices do not infringe because, even under UT's asserted definition of "adjacent," the CTI detectors include a light-coupling window which acts as an "imprecise light guide" which has been specifically disclaimed by UT.³

Because the presence of a light guide prevents the scintillation crystals and the light detectors from being "adjacent" as discussed above, the Court must conclude that CTI's devices do not literally infringe the patents at issue. UT's motion for partial summary judgment [Doc. 14] will be denied and CTI's cross motion for summary judgment of noninfringement [Doc. 26] will be granted.

IV. Conclusion

For the reasons set forth herein, the plaintiffs' motion to strike [Doc. 40] will be denied; plaintiffs' motion for partial summary judgment of infringement [Doc. 14] will be denied; and defendants' cross motion for summary judgment of noninfringement [Doc. 26] will be granted. In light of the Court's rulings on these motions, the remaining motions [Docs. 48, 50, 55] will be denied as moot and this case will be dismissed. An order reflecting this opinion will be entered.

s/ Thomas A. Varlan
UNITED STATES DISTRICT JUDGE

³CTI also argues that its detectors do not infringe UT's patents under the doctrine of equivalents. [Doc. 29 at p. 43.] UT does not argue infringement under the doctrine of equivalents, however, and the Court need not address this issue.